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A METHOD OF TREATING TRANSVERSE FRACTURE OF THE PATELLA.

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After MacEwen's investigations,[1] had shown that the cause of non-union in transverse fracture of the patella is the presence of soft tissues between the fragments, and that these tissues are commonly so entangled in the osseous irregularities of the fractured surfaces as to require, for their removal, careful scraping or dissection, surgical opinion rapidly accumulated in favor of the treatment of this fracture by open incision, clearing of the bony surfaces, and securing their apposition by means of suture of some kind. And brilliant successes were frequently so obtained. But the repeated occurrence of serious mishaps due to the operation, and the excellence of the functional results obtainable by non-operative methods eventually caused the backward swing of the pendulum, and now it is not expressing it too strongly to say that the operative method of treating recent fracture is generally regarded as unjustifiable. Various substitutes, such as tying the fragments together subcutaneously, or bolting them together by means of screws or drills subcutaneously introduced have been advanced. These and similar propositions necessitate invading the joint and leaving in it foreign bodies. For the crevice between the fragments is clinically a part of the joint cavity. Thus, while involving all or nearly all the risks of the operation they are intended to supersede, they do not attempt the only procedure which makes the latter justifiable—that of clearing the fractured surfaces This not being attempted, there remains to be secured such more or less complete approximation of the bony surfaces as the absence or presence of tendinous structure may permit. To accomplish this it is not necessary to

[1]Annals of Surgery, March, 1887.

enter the joint nor even to puncture the skin, except to relieve joint effusion when present.

Without enumerating the various external methods commonly used for treating this fracture, and criticising them in detail, it may be stated that they appear generally defective in one or more of the following respects :

1. They do not utilize all available surface in the application of approximating force. Not only is the force thus restricted to what a limited area will bear, but the means of applying the force is very liable to become displaced from its limited attachment.

2. They make no provision for adjustment to the varying conditions, atrophy, absorption, etc., of the parts which are acted upon.

3. The coapting force does not oppose in the most direct manner distracting force, but acts through the intervention of objects whose relations to the fragments to be approximated are variable and uncertain. Such objects are the foot and ankle joint, the splint which is applied to the limb, or even the bedstead upon which the patient lies.

The method here described was used in a case treated during the summer of 1885. The ultimate result was a separation of about $^{3}/_{4}$ inch and a practically perfect limb. The procedure was simply a combination of the expedients which constitute to great extent the orthopedic surgeon's mechanical pharmacopœia—removal of effusion, traction, fixation, and limitation of articular motion.

Two pieces of stout extension plaster were cut into right-angled triangles, A B C and A′ B′ C′, so that the warp ran in

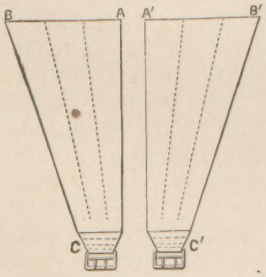

FIG. 1.

the direction of the hypothenuse, B C, B′ C′. The distance A B, A′ B′ is about one-third of the upper circumference of the thigh, and A C, A′ C′ is the length of the inner aspect of the thigh. The plaster was cut three inches longer than it appears in the figure, in order, by doubling it twice, to strengthen it sufficiently to hold the buckle sewn in. In cases of doubt it is safer to reinforce by the folding in of an additional piece. The triangles were divided longitudinally, as shown by the dotted lines, into three tongues, and were applied so that the buckles were situated over the condyles, while the two sets of tongues interlaced on the front

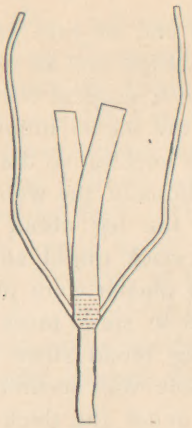

FIG. 2.

of the thigh (Fig. 3). A bandage of firm muslin served to maintain the necessary pressure to keep the plaster adhering. The buckles were left uncovered.

To the leg was applied the arrangement of adhesive straps commonly used for producing traction on the knee, but in a reversed direction. Four central strips of plaster, one and one-half inches wide, and long enough to extend from condyle to malleolus, and four side strips, one-half inch wide and one and one-half as long as the preceding, were cut. They are arranged in

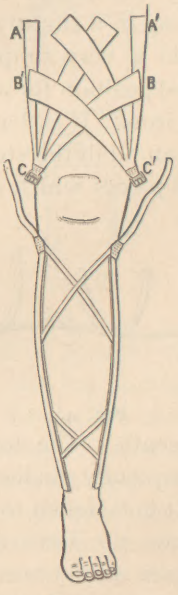

FIG. 3.

two sets as shown in Fig. 2, with the adhesive surfaces all facing

the same direction. One end of each pair of strips was folded over those of two smaller strips, and all were sewn to a short piece (about six inches), of $^{7}/_{8}$ inch surgical webbing. The two sets of plasters were applied to the leg as follows : The pieces of webbing were secured in the buckles, so that the pull came squarely on the latter. The junctions of the webbings and plasters were located on the side of the leg about three inches from the buckles in order that the slack might subsequently be taken in. The first broad strips of plaster were placed down the leg, the narrow strips were wound in spiral turns around the leg and the plaster, and the remaining broad strips placed on top of them all. (Fig. 3.) The whole was secured by a bandage, which passed over as well as under the thick end where the webbing was sewn. A firm base for counter traction was thus secured, and as the straps were drawn through the buckles, traction was exerted upon the whole surface of the quadriceps. Before the plaster was applied the joint had been punctured by a tenotome introduced as recommended by Barwell, in a direction oblique to the skin, for the purpose of producing a valve-like opening, and a clot having been extruded, a very perfect approximation was attained. It was easily possible even to cause the fragments to overlap. Fixation was provided by the use of the knee splint of Dr. Judson, and the limb was slung in a slightly elevated position. This instrument (Fig. 4) affords a very simple and perfect means of fixing a knee in any desired position for any purpose whatever. It is made of mild steel or iron. It is bandaged on or secured by straps and buckles. For an adult the stem should be one by one-eighth inch, and the cross pieces which are riveted to it should be

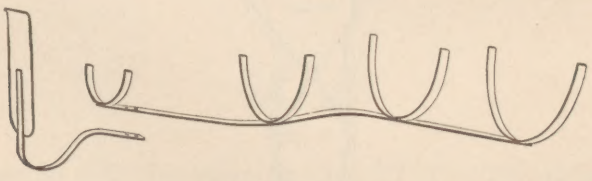

FIG. 4.

three-quarters by one-sixteenth. The foot piece, which is shown as detached, I have subsequently added for cases where support for the foot is desired. It is fastened to the brace by two screws and may be removed when the limb is used in walking. The surface of the knee was open at all times to inspection and adjustment. At the end of ten weeks the patient was allowed to walk, the joint being still immobilized by the Judson brace. Three

weeks later an instrument (Fig. 5), designed to accomplish the following ends, was applied : (1) To relieve the quadriceps muscle and therefore the patella from the strain involved in the act of extension. (2) To permit a regulated arc of motion. (3) To provide a safety check against any sudden and extreme flexion, such as might be produced by the patient's weight unexpectedly coming upon the not fully extended limb. The brace was attached to the shoe, the stiff spiral spring acted as an extensor. The strong steel discs shown at each side of the knee-joint, were centrally attached by the steel rivets of the joint, and each disc was provided with a circular slot, and a number of circularly arranged holes. By screwing the disc through one of these holes to the

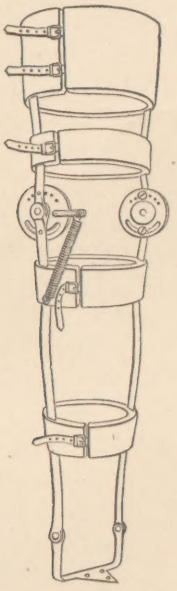

FIG. 5.

thigh-upright the slot could be brought to move as desired past a screw in the leg-upright. And the impingement of the end of the slot on the screw afforded the desired check. Motion was gradually increased. This apparatus was worn with perfect comfort, and the patient was able to walk and dance in it with ease. It gave her such a feeling of security that at the end of one and a half years she relinquished it with reluctance.